

## Foundation

### **Identifying the components on the raspberry PI B+**

- Display - Allows raspberry pi to display information
- USB - Allows connection to input devices such as mouse and keyboard.
- Power - Place you can plug into to give the device power
- CPU/RAM - Handles input and output functions, as well as calculations
- HDMI - Allows you to hook up to the raspberry pi to a television using an hdmi cable
- Camera - Capable of taking photo and video and being controlled with programs
- Ethernet - Allows for wired network access
- Ethernet Controller - Decodes data and puts it into a form the computer can understand

### **How many cores does the Raspberry Pi's B+ CPU have**

The raspberry pi B+ uses a quad core processor meaning it has 4 cores.

### **List three main differences between X86 (CISC) and ARM Raspberry PI (RISC). Justify your answer and use your own words (do not copy and Paste)**

- The main difference between the two is the instruction sets because the instruction set for x86 processing allows for more complicated instructions, whereas the instruction set for ARM processors has less than 100 instructions and is more simple.
- ARM does not access the memory and data comes from the register only, whereas x86 accesses the memory.
- X86 uses little endian, whereas ARM uses big endian.

### **What is the difference between sequential and parallel computation and identify the practical significance of each?**

Sequential computing is when a problem is broken into a set of instructions and they are solved sequentially, whereas parallel computing is when a problem is broken into parts that can be solved at the same time on multiple processors. A practical significance of each is parallel programming is used for large sets of data, so it can be used for databases. The practical significance of sequential computation is it is used with a lot of software.

### **Identify the basic form of data and task parallelism in computational problems.**

Task parallelism is the execution of multiple cores on many different functions across the same/different data sets.

Data parallelism is the execution on multiple cores of the same functions across the data sets.

**Explain the differences between processes and threads.**

Threads are a low level thread package and are used for writing programs for shared-memory hardware with multiple cores. Threads are used for smaller tasks, whereas processors are used for larger tasks. Processes are compiler directives that enable the compiler to generate threaded code. Also, threads with the same process share the same address space, whereas separate processes do not.

**What is OpenMP and what is OpenMP pragmas?**

OpenMP is a library for parallel programming where all threads share memory and data.

OpenMP pragmas are used to fork additional threads in order to carry out the work enclosed in the construct in parallel

**What applications benefit from multi-core(list four)?**

- Database servers
- Web servers
- Compilers
- Multimedia Application

**Why Multicore? (why not single core, list four)**

- It is difficult to make single-core clock frequencies even higher
- Deeply pipelined circuits: heat problems, speed of light problems, difficult design/verification
- Many new applications and multithreaded
- Server farms need expensive air conditioning